UNIVERSITI PUTRA MALAYSIA

UTILIZATION OF SETARIA SPHACELATA VARIETY SPLENDIDA BY KEDAH-KELANTAN CATTLE

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UTILIZATION OF *SETARIA SPHACELATA* VARIETY SPLENDIDA BY KEDAH-KELANTAN CATTLE

by

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A thesis submitted in partial fulfilment of the
requirements for the degree of Doctor of Philosophy
in the Faculty of Veterinary Medicine and Animal Science
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It is hereby certified that we have read this thesis entitled A Study on the Performance of Kedah-Kelantan Cattle Grazed on Setaria Sphacelata Variety Splendida by Romziah Sidik Budiono, and in our opinion it is satisfactory in terms of scope, quality and presentation as partial fulfilment of the requirements for the degree of Doctor of Philosophy.

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Date: 10 DEC 1986

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Dedicated to the memory of my late father and father-in-law

H.M. Sidik and Margono Wiryodirdjo

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LIST OF ABBREVIATION

mg	=	micro gram
g	=	gram
kg	=	kilogram
h	=	head
ha	=	hectare
m^2	=	meters square
d	=	day
MJ	=	mega joule
ml	=	mili liter
m mol	=	mili molecule
y	=	year

An abstract of the thesis presented to the Senate of Universiti Pertanian Malaysia as partial fulfilment of the requirements for the Degree of Doctor of Philosophy

UTILIZATION OF *SETARIA SPHACELATA* VARIETY SPLENDIDA BY KEDAH-KELANTAN CATTLE

by

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May 1986

Supervisor : Professor Dr. Syed Jalaluddin bin Syed Salim

Co-Supervisor : Dr. Pravee Vijchulata

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There is limited information on beef production from pasture in Malaysia, particularly on optimization of land for maximum production. *Setaria sphacelata* variety splendida is a tropical grass species which has been successfully established in Malaysia as a fodder for cattle. However, optimum stocking rates and grazing systems for *Setaria sphacelata* variety splendida pasture for maximum productivity for beef cattle has not been established.

The objective of this study was to determine the average daily gain per animal and total gain per hectare for Kedah-Kelantan cattle, the indigenous beef cattle in Malaysia. For this purpose experiments were conducted to determine the dry

matter yield, chemical composition and digestibility using the nylon bag technique (Experiment I) and *in vivo* digestibility of a *Setaria sphacelata* variety splendida pasture (Experiment II). Later experiments examined the effects of stocking rate, grazing system and urea-mollases supplementation (Experiment III) and energy and/or mineral supplementation (Experiment IV) on daily gain and total gain/ha of Kedah-Kelantan bulls grazed on a *Setaria sphacelata* variety splendida pasture.

Cutting heights (5, 10 and 20 cm) had no effect on yield, chemical composition and dry matter digestibility (DMD) of *Setaria sphacelata* variety splendida. Crude protein and dry matter digestibility declined with increasing cutting intervals. Total dry matter (DM) yield was highest with a 12-week cutting interval. The *in vivo* apparent dry matter digestibility was 63.1% and the mean value for nitrogen balance was 21.4 g/h/d for bulls consuming sun dried *Setaria sphacelata* variety splendida cut at 5 weeks old.

Total live weight gain was significantly higher (3 kg vs 2 kg/ha/d) ($P < 0.05$) at a stocking rate of 10 animals/ha (High) than 5 animals/ha (Low) although the daily gain was significantly better on low than on the high stocking rate (425 vs 311 g/d). Type of grazing system did not influence average daily gain or total gain per hectare. Urea-mollases supplementation did not improve the daily gain of animals at

the high stocking rate. Palm kernel cake alone or in combination with mineral supplementation increased growth rates of bulls grazing continuously on a Setaria sphacelata variety splendida pasture at a stocking rate 6.25 animals/ha.

From these results it may be recommended that a 6-week cutting interval for a cut and carry system or a 5-week interval for a grazing system optimises forage yield and DDM for a Setaria sphacelata variety splendida pasture. The optimum stocking rate for this pasture grazed continuously or rotationally is 12.6 Kedah-Kelantan bulls per hectare which is equivalent to 4.6 animal unit/ha. There is little benefit of a urea-mollases supplementation at a stocking rate of 10 animals/ha. The possibility, however, exists that supplementation may be beneficial at higher stocking rates.

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UTILISASI RUMPUT SETARIA SPHACELATA VARIETY SPLENDIDA OLEH LEMBU KEDAH-KELANTAN

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Di Malaysia, terdapat keterangan yang kurang tentang pengeluaran lembu pedaging berhubung dengan penggunaan padang rumput terutamanya dalam menentukan penggunaan padang yang optima untuk pengeluaran yang paling tinggi. Setaria sphacelata variety splendida adalah sejenis rumput di kawasan tropik yang telah berhasil ditanam di Malaysia untuk digunakan sebagai bahan makanan lembu. Walau bagaimana pun kadar muatan yang optimum serta sistem ragutan untuk menghasilkan pengeluaran daging yang tinggi dari rumput Setaria sphacelata variety splendida belum diselidiki.

Tujuan penyelidikan ini adalah untuk menentukan purata kenaikan berat badan setiap ekor lembu dan kenaikan berat badan

yang terkumpul dari setiap hektar padang rumput. Bagi maksud ini, eksperimen-eksperimen telah dijalankan dalam menentukan bahan kering, kadar bahan kimia dan nilai pencernaan dengan cara menggunakan teknik bag nailon (Eksperimen I) dari rumput Setaria sphacelata variety splendida. Eksperimen seterusnya ialah untuk mengkaji kesan kadar muatan, sistem ragutan dan pemberian makanan tambahan yang berupa campuran urea dan molasses (Eksperimen III) dan pemberian tambahan tenaga dan/atau mineral (Eksperimen IV) terhadap kenaikan berat badan satu ekar atau satu hektar lembu Kedah-Kelantan yang meragut rumput Setaria sphacelata variety splendida.

Paras pemotongan (5, 10 dan 20 cm) tidak memberi kesan pada hasil bahan kering, kadar bahan kimia dan nilai pencernaan rumput Setaria sphacelata variety splendida. Protin kasar dan nilai pencernaan menurun dengan meningkatnya jarak waktu pemotongan. Bahan kering yang terkumpul sangat tinggi pada jarak pemotongan setiap 12 minggu. Nilai pencernaan sebenar adalah 63.1% dan nilai purata keseimbangan nitrogen sebesar 21.4 g/ekor/hari untuk lembu jantan yang makan rumput kering Setaria sphacela variety splendida yang dipotong semasa berumur 5 minggu.

Kanaikan berat badan yang terkumpul nyata tertinggi (3 dibandingkan dengan 2 kg/ha/hari) ($P < 0.05$) pada tingkat kadar muatan 10 ekor/ha (tinggi) dibandingkan dengan 5 ekor/ha (rendah) walaupun kenaikan berat badan nyata lebih baik pada

kadar muatan yang rendah dibandingkan dengan kadar muatan yang tinggi (425 dibandingkan dengan 311 g/hari). Jenis sistem ragutan tidak mempengaruhi nilai purata kenaikan berat badan satu ekor atau satu haktar. Makanan tambahan urea-molasses tidak dapat meningkatkan kenaikan berat badan lembu yang dipelihara dengan kadar muatan tinggi (10 ekar/ha). Bungkil kelapa sawit sahaja atau campuran mineral dengan bungkil kelapa sawit dapat meningkatkan kecepatan pertumbuhan lembu jantan yang meragut rumput Setaria sphacelata variety splendida secara berterusan dengan kadar muatan 6.25 ekor/ha.

Hasil penyelidikan menunjukkan bahawa jarak pemotongan setiap 6 minggu sekali dapat dilaksanakan untuk sistem potong dan bawa atau jarak pemotongan setiap 5 minggu dapat dilaksanakan untuk sistem ragutan bagi mendapatkan nilai optima daripada hasil perumputan dan bahan kering yang tercerna bagi rumput Setaria sphacelata variety splendida. Nilai optimum kadar muatan untuk padang rumput yang diragut secara berterusan atau bergilir adalah 12.6 ekor/ha atau sama dengan 4.6 ekor unit/hektar. Hanya sedikit keuntungan yang didapati daripada makanan tambahan urea dan molasses pada lembu dengan kadar muatan 10 ekar/ha. Kemungkinan hal ini dapat menguntungkan apabila pemberian makan diberikan padalembu dengan kadar muatan yang lebih tinggi lagi.

CHAPTER I

INTRODUCTION

Ruminants are capable of digesting cell wall components of grass through microbial functions, therefore grass become the primary source of feed for cattle. Grass quality and output of production from cattle are closely related. The animals require nutrients from the grasses for body maintenance, work, reproduction of meat and milk, etc. Grasses itself take nutrients from the soil.

Efficient animal production from pasture is basically determined by the intake of forage, the nutritive values of the ingested materials and the availability of the forage biomass. Dry matter yield of the forage is negatively correlated to its feed values (Raymond, 1969; Moore, 1980). While biomass produced per unit area increases with maturity, its nutritive values, especially, crude protein and digestibility fall. Hence, forage consumption by animals decline.

Stocking rate and grazing system, are important management factors that may influence production per animal and total animal production per unit area of pasture land. Stocking rate affects individual animal performance by an amount which will vary from year to year and from one season of the year to another (Morley, 1981). The optimum stocking rate can be

estimated by predicting the relationship between stocking rate and animal production per head, per hectare in terms of live weight gain base on an optimum grazing pressure (Mott, 1960).

If the pasture is undergrazed or overgrazed the animal production per head will be reduced and potential production of an animal underestimated (Mott, 1960). When there is a good supply of pasture, stocking rate has little effect on individual animal performance, since there is enough fodder for each animal. As the stocking rate of the pasture increased, the individual animal output starts to decrease, as animals begin to compete with each other for the available forage supply and have less opportunity to select the most nutritious parts of the pastures (Humpreys, 1978).

The optimum stocking rate of a pasture, however, varies according to the specific grass species available together with its managements. Since different breeds of animal may impose different demands on pasture because their feed requirements may differ and they may graze in different way (Morley and Speeding, 1968) type, species and physiological difference of the animals grazed on the pasture can also influence the optimum carrying capacity of the paddock.

In situations where nutrients available from the pasture cannot meet the requirement of the animals, improvement can be obtained by supplementing the grazing animals with energy, protein or non protein nitrogen (Alden, 1981) and/or minerals (McDowell and Conrad, 1977).

Proper management of the pasture for compromising the various factors is therefore essential and is found to be specific for individual forage species (Moore and Mott, 1973; Whiteman, 1980).

Setaria Sphacelata is a tropical grass which grows well in areas of reasonalbly high rainfall, usually over 700 mm (Luck, 1979). Although dry matter of leaves is low and crude protein content averages at 10%, the forage is palatable. The grass regenerates rapidly after grazing (defoliation) or cutting (Bogdan, 1979F). This grass has been successfully introduced into Malaysia as a forage crop for cattle. The information on its nutritive values and its potential as a pasture grass under various grazing management system for Kedah-Kelantan (KK) cattle, is rather limited.

Kedah-Kelantan cattle are the main indigenous beef cattle breed in Malaysia. The breed is well adapted to the environmental conditions. They are used mainly for beef and draught (Devendra et al, 1973). Although the breed is known for its high fertility, the live weight gain of KK cattle, however, is relatively low in comparison to the improved beef breeds such as Brahman or Droughtmaster (Devendra, 1973). It is possible that the low daily live weight gain of KK cattle may, in part, reflect the substandard nutrition and management. Therefore, with proper management and nutrition, daily live weight gain of this breed might be improved.